ALGEBRA 1 Name: Solutions

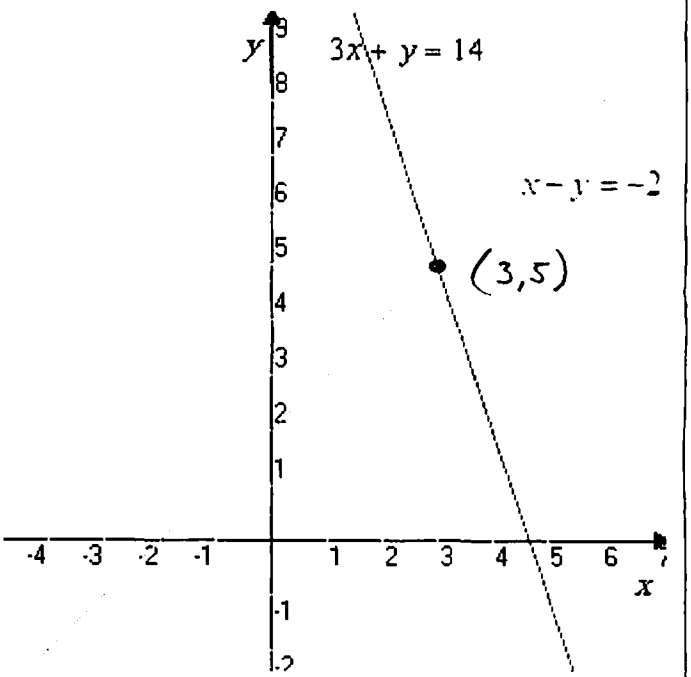
A Finely Crafted O'Brien Unit 7 Opportunity Day

Non-calculator section: This is your opportunity to show me what you know. You may not use a calculator or computer on the first part, but once you submit this page, you will get the second part. You will be able to use the applications on your computer like Geogebra, Numbers, Calculator on that part. You will not be able to use the internet or notes. Use a *sharp* pencil and a straight edge. Show all work neatly and circle your answer. There **will not be** Supercorrections for this test.

1. John is trying to solve this system:

$$+\begin{cases} 3x+y=14 \\ x-y=-2 \end{cases}$$

He correctly graphs it at right.



a. Indicate where the solution lies on John's graph.

b. Solve the system using the Elimination Method.

$4x = 12$

$x = 3$

$3 - y = -2$

$+2 \quad +y \quad +2 \quad +y$

$y = 5$

2. Maiden Eror is trying to solve this system:

$$\begin{cases} 7x-3y=4 \\ y=2x+1 \end{cases}$$

She uses the Substitution Method, and here is her working:

$7x-3(2x+1)=4$

$7x-6x+3=4$ *So,* $y=2(1)+1$

$x+3=4$ $y=3$

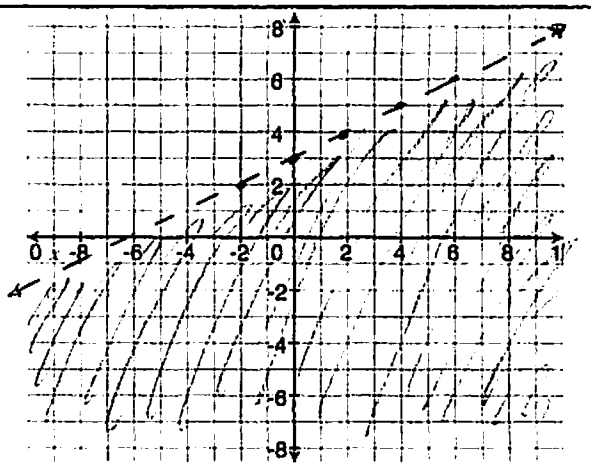
$x=1$

Check her answer to see if it works. If it doesn't, **circle** the mistake in her working.

$7(1)-3(3) = 7-9$ which is not 4! ✗

3. Solve by graphing.

$$y < \frac{1}{2}x + 3$$



4. Solve the system using the Elimination Method.

$$\begin{cases} x + 2y = 4 \\ (3x - y) = (5) \end{cases} \quad \times 2$$

$x + 2y = 4$

$6x - 2y = 10$

$7x = 14$

$x = 2$

$2 + 2y = 4$

$2y = 2$

$y = 1$

$2 + 2(1) = 4$ ✓

$3(2) - 1 = 5$ ✓

5. Solve the system using the Substitution Method.

$$\begin{cases} 2x + 3y = 13 \\ y = x + 1 \end{cases}$$

$2x + 3(x + 1) = 13$

$2x + 3x + 3 = 13$

$-3 \quad -3$

$5x = 10$

$x = 2$

$y = 2 + 1$

$y = 3$

$2(2) + 3(3) = 13$ ✓

$3 = 2 + 1$ ✓

6. Solve this system using any method that you like.

$$\begin{cases} y = -x + 8 \\ y = 3x + 4 \end{cases}$$

$-x + 8 = 3x + 4$

$+x \quad -4 \quad +x \quad -4$

$4 = 4x$

$x = 1$

$y = -1 + 8$

$y = 7$

$7 = -1 + 8$ ✓

$7 = 3(1) + 4$ ✓

ALGEBRA 1 Name:_____

Computer section: *Applications like Geogebra, Grapher, Calculator ok, but no internet or notes.*

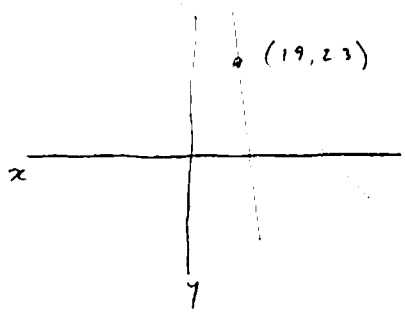
7. Bill is trying to solve this word problem:

A vending machine contains quarters and nickels. It has 42 coins worth $5.90. How many quarters does it have?

He knows that he could solve this with the Guess and Check method without too much difficulty, but he wants to do it algebraically. He considers three possible systems:

a. $\begin{cases} x+y=5.90 \\ 0.25x+0.05y=42 \end{cases}$ b. $\begin{cases} x+y=42 \\ x+y=5.90 \end{cases}$ c. $\begin{cases} x+y=42 \\ 0.25x+0.05y=5.90 \end{cases}$

Circle the correct system and then solve it however you'd like (if you use a graph, include a rough sketch of the graph).



Answer the question: 19 quarters

8. Complete the table of values for the equation $y=3x-2$.

x	−1	0	1	2	3	4
y	-5	-2	1	4	7	10

Do the same for the equation $y=6-x$. (Hint: After you've found two values, look for the pattern!)

x	−1	0	1	2	3	4
y	7	6	5	4	3	2

Use your tables above to give the solution to the system $\begin{cases} y=3x-2 \\ y=6-x \end{cases}$.

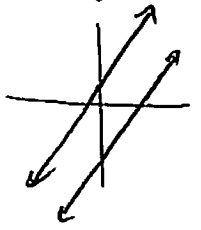
Solution: (2, 4)

9. Consider the system:

$$\begin{cases} y = 2x + 1 \\ y = mx + b \end{cases}$$

Choose values for m and b so that the system above would have

i. no solution

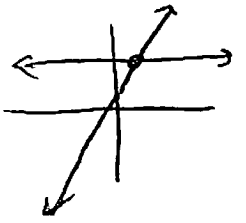


$m = 2$

b = anything except 1

(makes lines parallel)

ii. one solution



m = anything except 2

b = anything

(makes lines cross)

10. Kathy needs to graph the system $\begin{cases} y - x \le 3 \\ y + x \ge 3 \end{cases}$. She has done the first step by graphing the system of **equations** $\begin{cases} y - x = 3 \\ y + x = 3 \end{cases}$ at right.

$y \le x + 3$

$y \ge -x + 3$

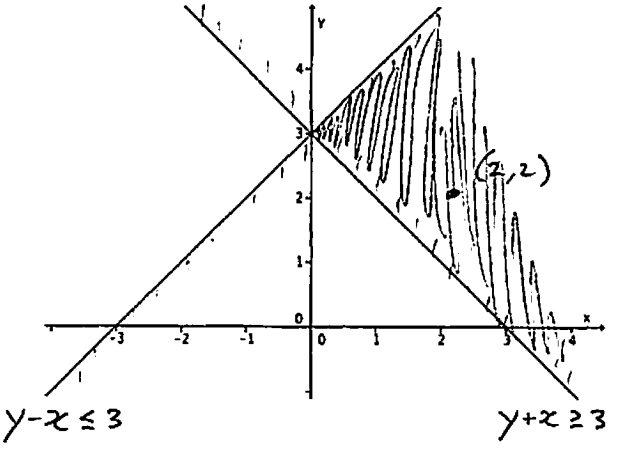
a. Finish Kathy's work by shading the correct part of the graph.

Test (0,0)

$0 \le 3$ ✓

$0 \ge 3$ ×

b. Choose a point (x, y) from the shaded region and shows that it works in the system $\begin{cases} y - x \le 3 \\ y + x \ge 3 \end{cases}$.



example: (2,2):

$2 - 2 \le 3$

$0 \le 3$ ✓

$2 + 2 \ge 3$

$4 \ge 3$ ✓

11-12. There are four word problems below. You are to do any two of them for credit and you may select others for extra credit. Be sure to note which ones are for extra credit – indicate which by putting EC next to them. You may solve with algebra or with a graphing program. If you use a graph, include a rough sketch of the graph.

x = 3x y x+6 = 1+ 2x y+6

a. Wendy is three times as old as Nat. In six years Wendy will be one year older than twice Nat's age. How old are they both now?

Identify variables:

Let x be Wendy's age now

Let y be Nat's age now

Set up system:

$$\begin{cases} x = 3y \\ x+6 = 1+2(y+6) \end{cases}$$

Solve the system:

$3y + 6 = 1 + 2(y+6)$

$3y + 6 = 1 + 2y + 12$

$y + 6 = 13$

$y = 7$

$x = 3(7)$

$x = 21$

Answer the question:

Wendy is 21. Nat is 7.

b. With a tailwind, a jet flew 2250 miles in 4.5 hours, but the return trip against the same wind required 5 hours. Find the jet's speed and the wind speed.

Identify variables:

Let x be the jet speed

Let y be the wind speed

Set up system:

$$\begin{cases} 2250 = (x+y)4.5 \\ 2250 = (x-y)5 \end{cases}$$

Solve the system:

$\frac{2250}{4.5} = \frac{(x+y)4.5}{4.5}$

$500 = x + y$

$\frac{2250}{5} = \frac{(x-y)5}{5}$

$450 = x - y$

$500 = x + y$

$450 = x - y$

$\frac{950}{2} = \frac{2x}{2}$

$x = 475$

$475 + y = 500$

$y = 25$

Answer the question:

Jet speed is 475 mph and Wind speed is 25 mph

$t+u$ $= 12$ $10t+u = 18+$

c. The sum of the digits of a two-digit number is 12. The value of the number is 18 more than the value of the number formed if the digits are reversed. What is the number?

$10u+t$

Identify variables:

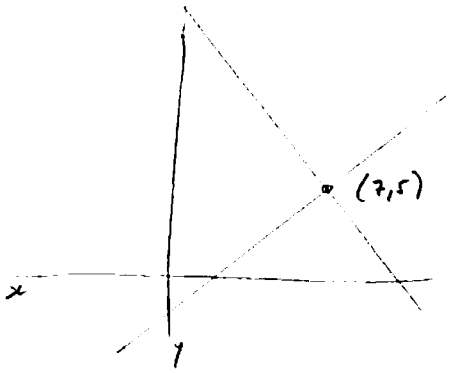
Let t be the tens digit

Let u be the units digit

Set up system:

$$\begin{cases} t+u=12 \\ 10t+u=18+10u+t \end{cases}$$

Solve the system:



Answer the question: 75

d. A 15% acid solution is mixed with a 39% acid solution. How many liters of each are required to make 16 liters of a 30% acid solution?

Identify variables:

Let x be # of liters of 15% solution

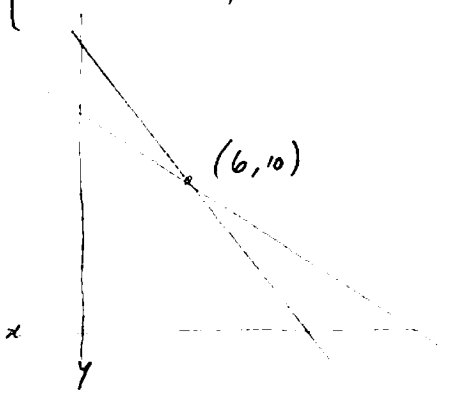
Let y be # of liters of 39% solution

Set up system:

$$\begin{cases} x+y=16 \\ 0.15x+0.39y=0.3(16) \end{cases}$$

Solve the system:

	Liters	Acid
15%	x	$0.15x$
39%	y	$0.39y$
30%	16	$0.3(16)$



Answer the question: 6 liters of 15%
10 liters of 39%.

Every problem on this test can be checked to ensure you have answered it correctly. Maximize your test grade by going back and checking your answers!